

REMARKS

This Amendment is in response to the Office Action mailed on January 21, 2005.

Claims 1-3 stand rejected under 35 U.S.C § 102(b) as being anticipated by U.S. Patent No. 5,907,403 to Andrews *et al.* Claims 16-18 are rejected 35 U.S.C § 102(b) as being anticipated by U.S. Patent No. 5,301,001 to Murphy *et al.*

Claims 4-15 stand rejected under 35 U.S.C § 103 as being obvious over a hypothetical combination of Andrews and U.S. Patent No. 4,986,671 to Sun *et al.*, and claims 19-21 are rejected under 35 U.S.C § 103 as being obvious over a hypothetical combination of Murphy and Sun.

Claims 1-5 and 7-10 have been amended, and claims 22-26 are new.

Independent claim 1, which stands rejected due to the Andrews patent, is amended to recite that the co-located pressure and temperature sensors are operatively connected to a launch fiber, and that the temperature sensor is made from a material that is substantially different than the material of the launch fiber, among other things. Support for this amendment is found in the specification at ¶ 26, where launch fiber 22 is described as being single mode, multimode, polarization maintaining or plastic fiber, and in ¶¶ 37, 41, 43 and 44, where the temperature sensor is described as being made from materials that have refractive index that changes with temperature, *e.g.*, silicon.

On the other hand, the Andrews reference discloses an optical sensor 210 with a temperature component and pressure component. (See Andrews at col. 4, lines 4-12 and lines 37-48.) The temperature is allegedly measurable between reflective surfaces 214 and 14 and the pressure is allegedly measurable across gap 20 between surfaces 14 and 18, as shown in FIGS. 2a and 2b. The temperature component comprises single mode fiber 212, which is bonded to single mode launch fiber 12, *i.e.*, the material of the launch fiber and the material of the launch fiber are the same.

Additionally, claim 1 is further amended to recite that the end of the launch fiber forms a part of the pressure sensor. In other words, the pressure sensor is located next to the launch fiber or upstream of the temperature sensor. Contrary to amended claim 1, the Andrews reference shows that the pressure sensor is spaced apart from the launch fiber.

Claims 2-10 and new claims 22- 26 depend directly or indirectly on claim 1 and recite further limitations therefrom, and hence these claims are also currently patentable due to their dependency. Claims 2-5 and 7-10 are amended to better describe the invention and their amendments are not related to the rejections stated by the Examiner. Applicants believe that it is unnecessary to address the Examiner's specific grounds of rejection of the dependent

claims at this time. Except for the hypothetical combination of the Andrews and Sun references, discussed below, Applicants reserve the right to address these rejections should that become necessary.

Applicants traverse the hypothetical combination of the Andrews and Sun references. The Examiner states that the Sun reference discloses a material with a refractive index that changes with temperature and that it would have been obvious to one of ordinary skill in the art to modify the Andrews reference to include this material. A closer examination of the Andrews reference reveals that while this reference allegedly discloses getting optical signals for both temperature and pressure readings, it cannot process the reflected signals to obtain useful readings. The Examiner's attention is respectfully directed to Col. 5, lines 28-58 and to FIG. 3 of the Andrews reference. First, FIG. 3 illustrates the processing of the signals with a diagram showing strain reading and another diagram showing temperature reading.

Applicants note that many reference numbers are simply missing from the temperature reading diagram. In Col. 5, the Andrews reference discusses the optical path that a signal would follow through parts, but not all, of the strain reading diagram. Unexpectedly, the discussion abruptly ends after stating that "optical detectors 336 and 338 detect the optical power." (Col. 5, line 58). The purpose and functions of element 340, wires 344 and "PI" 342 were unexplained or even discussed in this reference. Applicants submit that detecting optical powers alone may be insufficient to ascertain the information needed to determine a strain reading. Interference patterns, among other factors, are necessary. Importantly, the Andrews reference does not discuss or explain any part of the temperature reading diagram shown in FIG. 3. These omissions from the Andrews reference strongly suggest that its authors could not discriminate the temperature reading from the pressure reading.

Applicants respectfully submit that the Andrews reference is inoperative for the hypothetical combination with the Sun reference suggested by the Examiner. A person of ordinary skill in the art reading the Andrews reference can reasonable conclude that one cannot separate or process optical signals from a combined temperature/pressure sensor and therefore would not combine the Andrews reference with the temperature sensor disclosed in the Sun reference. Moreover, the defects in the Andrews reference strongly discourage those of ordinary skill in the art from combining Andrews with any other reference.

Independent claims 11 and 13 are directed to methods of forming or making the inventive co-located temperature/pressure sensor. Claims 11 and 13 are rejected over the hypothetical combination of the Andrews and Sun references. This hypothetical combination is improper as explained in detail above. Additionally, Applicants submit that the Andrews

reference does not discuss any method of making a sensor, and the Sun reference discloses a method of using a sensor (see claims 43-44) not a method of making one. For this additional reason, independent claims 11 and 13 are presently patentable.

Claims 12, 14-15 depend directly or indirectly from claim 11 or 13, respectively, and recite further limitations therefrom, and hence these claims are also currently patentable due to their dependency. Hence, Applicants believe that it is unnecessary to address the Examiner's specific grounds of rejection of the dependent claims at this time. Applicants reserve the right to address these rejections should that become necessary.

Independent claim 16 recites two co-located sensors and is rejected by the Examiner as being anticipated by the Murphy reference. Applicants respectfully traverse this rejection. In paragraph 3.a of the Office Action, the Examiner states that FIG. 8 of the Murphy reference discloses "optical sensor (34) comprising a first pressure sensor co-located with a first temperature sensor and a second pressure sensor co-located with a second temperature sensor which are each located within a cavity of a tube (45/46)(Fig. 8)." Actually, element 34 does not disclose temperature sensing capability. The Examiner's attention is respectfully directed to the specification of Murphy at Col. 6, line 43 to Col. 7, line 13 and to FIGS. 6-8. The entire purpose of this portion of the disclosure is to obtain a "quadrature phase-shifted, extrinsic Fizeau sensor." More specifically, the Murphy reference teaches:

FIG. 8 shows a system using two different silica tubes 45 and 46 and two different multimode fibers 47 and 48, the two multimode fibers 47 and 48 being movable in unison. In this construction, the quadrature phase shift is also adjusted actively. Since the two tubes have external diameters on the order of a few hundred micrometers, the two sensors monitor almost the same environmental perturbations.

(Col. 7, lines 6-13).

An exemplary quadrature signal is illustrated in FIG. 9 of the Murphy reference. Hence, Applicants submit that independent claim 16 is patentable over the Murphy reference.

Claims 17-19 depend directly or indirectly from claim 16 and recite further limitations therefrom, and hence these claims are also currently patentable due to their dependency. Hence, Applicants believe that it is unnecessary to address the Examiner's specific grounds of rejection of the dependent claims at this time. Applicants reserve the right to address these rejections should that become necessary.

Independent claim 20 is directed to a method of forming a sensor having two cavities and attaching a disk and bonding a fiber to each cavity, among other elements. This claim is being rejected by the Examiner over the hypothetical combination of Murphy and Sun.

Applicants respectfully traverse this rejection. As discussed above, the Murphy reference in the portions relied upon by the Examiner teaches a "quadrature phase-shifted, extrinsic Fizeau sensor," and the Sun reference discloses a temperature sensor. There is no motive to combine these references. The quadrature phase-shift in Murphy is achieved or fine-tuned by carefully moving two fibers (47, 48) in unison. (See quoted passage above). Adding a temperature sensor to this configuration would adversely affect the quadrature phase shift, thereby defeating any motive to combine these references. Hence, claim 20 is presently patentable over the hypothetical combination of Murphy and Sun.

Claim 21 depends directly from claim 20 and recites further limitations therefrom, and hence this claim is also currently patentable due to its dependency. Hence, Applicants believe that it is unnecessary to address the Examiner's specific grounds of rejection of the dependent claims at this time. Applicants reserve the right to address these rejections should that become necessary.

Applicants believe that \$300.00 in fees are due in connection with this filing: \$120.00 for a one-month extension of time for the submission of this Amendment and \$180.00 for the submission of the Supplemental IDS. If any additional fee is due, the Commissioner may charge appropriate fees or credit any overpayments to H.T. Than Law Group, Deposit Account No. 50-1980.

Respectfully submitted,

Date May 20, 2005

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